REQUEST FORM FOR APPLICATION UNDER 37 CFR 1.53(b)

DOCKET NUMBER: 57042-036
Prior Application:
Art Unit: **2731**
Examiner: **T. Bocure**

Assistant Commissioner for Patents
Washington, DC 20231

Sir:

This is a Request for filing a **Continuation** application under 37 CFR 1.53(b) of pending prior application Serial No. 09/273,508, filed on March 22, 1999, entitled **COMMON PACKET CHANNEL**, by the following named inventors: Emmanuel KANTERAKIS, Kourosh PARSA.

1. ☒ I hereby state that the enclosed application contains no new matter.

2. Oath or Declaration
   a. ☐ Newly executed (original or copy)
   b. ☒ Copy from a prior application (37 CFR 1.63(d))
      i. ☐ Deletion of inventor(s)
      Signed statement attached deleting inventor(s) named in the prior application, see 37 CFR 1.63(d)(2) and 1.33(b).

3. ☒ Incorporation By Reference (useable if Box 2b is checked)
   The entire disclosure of the prior application, from which a copy of the oath or declaration is supplied under Box 2b, is considered as being part of the disclosure of the accompanying application and is hereby incorporated by reference therein.

4. ☒ Preliminary Amendment is enclosed.

5. ☒ An Information Disclosure Statement and PTO1449 Form are submitted herewith.

6. ☐ Cancel claims .

7. The filing fee is calculated on the basis of the claims existing in the prior application as amended at 4 and 6 above:

	NO. OF CLAIMS		EXTRA CLAIMS	RATE	AMOUNT
Total Claims	16	-20	0	$18.00 =	$0.00
Independent Claims	4	-3	1	$80.00 =	$80.00
				Basic Application Fee	$710.00
				If multiple dependent claims are presented, add $0.00	$0.00
				Total Application Fee	$790.00
				Subtract ½ if small entity	$0.00
				TOTAL APPLICATION FEE DUE	$790.00
				AMOUNT TO BE CHARGED TO DEPOSIT ACCOUNT NO. 500417	**$790.00**

7a. ☐ Enclosed is a Verified Statement to establish small entity status under 37 CFR 1.9 and 37 CFR 1.27.

7b. ☐ A verified Statement to establish small entity status under 37 CFR 1.9 and 37 CFR 1.27 was filed in prior application and such status is still proper and desired.

8a. ☒ **PLEASE CHARGE DEPOSIT ACCOUNT 500417 in the amount of $790.00**

8b. ☒ The Commissioner is hereby authorized to charge fees under 37 CFR 1.16 and 1.17 which may be required, including any extension of time fees to maintain the pendency of the parent application Serial No. 09/273,508 or credit any overpayment to Deposit Account No. 500417.

9. ☒ Amend the specification by inserting before the first line the sentence:

--This application is a Continuation of Application Serial No. 09/273,508 filed March 22, 1999.--

10. ☐ Priority of Application Serial No. ________ filed on _________, in _________ is claimed under 35 USC 119. The certified priority document(s) were filed in Serial No. ________ on _________.

11. ☒ The prior application is assigned of record to

Golden Bridge Technology, Inc.
West Long Branch, New Jersey

12. ☒ The power of attorney in the prior application is to David Newman Chartered with an associate power of attorney to Keith E. George and Gene Z. Rubinson of McDermott, Will & Emery.

13. ☒ Also enclosed:

Associate Power of Attorney (copy from parent file)
Correspondence Address Change
Request for Approval of Drawings Amendment
Transmittal of Formal Drawings

14. ☐ A petition, fee and response has been filed to extend the term in the pending prior application until .

15. ☒ Address all future communications to:

McDermott, Will & Emery
600 13th Street, N.W.
Washington, DC 20005-3096

Respectfully submitted,

MCDERMOTT, WILL & EMERY

Keith E. George

Keith E. George
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Date: October 5, 2000
Facsimile: (202) 756-8087

JOHNSON CONTROL REQUEST FORM

UNITS: ____________ NAME: ____________________

DATE OF REQUEST: ______________________ JC#: ____________

SERIAL NUMNBER: ____________________________

EXPLANATION:

MAIL DATE CHANGE FROM __________ TO ____________

- _____EXPRESS MAIL LABEL FROM ENVOLOPE ENCLOSED
- _____CERTIFIED MAIL POSTCARD ENCLOSED

DUPLICATE CASES

- ______CASE TO BE KILLED
- ______MAIL DATE.
- ______BOTH CASES ARE SECURE

CHANGES OF PATENT TYPES

OLD SERIAL NUMBER ________________________________ U/D/PL/PR (CIRCLE ONE)

RESULT(S) OF THE ABOVE REQUEST: ____________________

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JOHNSON CONTROL ONLY

(CIRCLE ONE)

UNSUCCESSFUL COMPLETED

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DELIVER TO: MICHELLE TERRELL-EVANS
CYNTHIA STREATER
SHARON THORTON

PLEASE GIVE DETAILS IN REFERENCE TO ANY UNSUCCESSFUL DECISION

Docket No.: 57042-036 (GBTI90US) **PATENT**

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of	:	
Emmanuel KANTERAKIS et al.	:	
Serial No.: unknown (Continuation of SN 09/273,508, which was filed March 22, 1999)	:	Group Art Unit:
Filed: October 5, 2000	:	Examiner:
For: COMMON PACKET CHANNEL		

PRELIMINARY AMENDMENT

Assistant Commission for Patents
Washington, DC 20231

Sir:

Prior to examination of the above-identified application, please amend the application as discussed below.

In the Specification:

On Page 1, Line 10, delete the words ",but no consideration is given to closed-loop power control or collision detection.";

On Page 2, Line 6, delete the word "a" and replace with --A--;

On Page 3, Line 10, delete the word "MS" and replace with --RS--;

On Page 3, Line 21, delete the word "mobile" and replace it with --remote--;

On Page 5, Line 23, change "315" to --314--;

On Page 8, line 10, delete the word "MS" and replace it with --RS--;

On Page 8, Line 11, delete the word "MS" and replace with --RS--;

On Page 8, Line 12, delete the word "MS" and replace with --RS--;

On Page 8, Line 13, delete the word "mobile" and replace with --remote--;

On Page 8, Line 14, delete the word "MS" and replace with --RS--;

On Page 9, Line 5, delete the word "MS" and replace with --RS--;

On Page 10, Line 13, delete the word "despeading" and replace with --despreading--;

On Page 10, Line 15, delete the word "an";

On Page 14, Line 19, delete the word "MS" and replace with --RS--;

On Page 15, Line 24, delete the word "bemote" and replace with --remote--;

On Page 17, Line 16, delete the word "seizes" and replace with --ceases--;

On Page 17, Line 20, delete the word "seizes" and replace with --ceases--;

On Page 18, Line 7, delete the word "priorities" and replace with --priority--;

On Page 18, Line 16, delete the word "it's" and replace with --its--; and

On Page 26, Line 13, delete the words "the the" and replace with --the--.

In the Claims:

Please cancel original (photocopy) claims 1-4 without prejudice or disclaimer.

Please add new claims 5-20, as shown below.

--5. A code-division-multiple-access (CDMA) wireless base station, comprising:

a CDMA transmitter;

a CDMA receiver; and

a controller coupled to the CDMA receiver for responding to signals received via the CDMA receiver and coupled for controlling the CDMA transmitter, such that in operation the CDMA base station is for performing the following steps:

receiving from a remote station an access burst comprising a sequence of coded preamble signals at sequentially increasing discrete power levels;

detecting a first one of the coded preamble signals of the sequence that is received at an adequate power level;

upon detection of the first coded preamble signal at the adequate power level, transmitting an acknowledgement signal;

receiving from the remote station a remote station collision detection preamble;

transmitting to the remote station a base station collision detection preamble corresponding to the received remote station collision detection preamble;

receiving any of data and control information over the common packet channel from the remote station; and

transmitting any of data and control information to the remote station.

6. A code-division-multiple-access (CDMA) wireless remote station, comprising:

a CDMA transmitter;

a CDMA receiver; and

a controller coupled to the CDMA receiver for responding to signals received via the CDMA receiver and coupled for controlling the CDMA transmitter, such that in operation the CDMA remote station is for performing the following steps:

transmitting over a common packet channel a plurality of coded preamble signals at sequentially increasing discrete power levels to the base station;

receiving an acknowledgement signal from the base station following transmission of one or more of the coded preamble signals;

transmitting a collision detection preamble to the base station in response to receipt of the acknowledgement signal;

receiving a base station collision detection preamble from the base station, the base station collision detection preamble corresponding to the

transmitted collision detection preamble;

transmitting any of data and control information over the common packet channel to the base station; and

receiving over the common synchronization channel any of data and control information from the base station.

7. A base band processor for use in a code-division-multiple-access (CDMA) wireless base station, comprising:

a preamble processor, for detecting a preamble in received spread-spectrum signals;

a data and control processor, for detecting and processing data and control information contained in the received spread-spectrum signals;

an encoder, for encoding data;

an interleaver, coupled to the encoder, for interleaving encoded data;

a packet formatter, coupled to the interleaver, for formatting any of the interleaved encoded data, signaling, acknowledgment signal, collision detection signal, pilot signal and transmission power control (TPC) signal into a packet; and

a controller coupled to the preamble processor, the data and control processor and to the packet formatter for controlling the preamble processor, the data and control processor and the packet formatter, such that in operation the base band processor is for performing the following steps:

detecting a first one of a sequence of coded preamble signals of the sequence that is embedded in a first spread-spectrum signal received at an adequate power level;

upon detection of the first coded preamble signal at the adequate power level, generating a packet comprising an acknowledgement signal and outputting the packet comprising the acknowledgement signal to a modulator of the wireless base station;

detecting a collision detection preamble in a second spread-spectrum signal received at the wireless base station;

generating a packet comprising a base station collision detection preamble corresponding to the received collision detection preamble and outputting the packet comprising the base station collision detection preamble to

the modulator of the wireless base station; and

generating a packet comprising any of data and control information and outputting the packet to the modulator of the wireless base station.

8. The base band processor as set forth in claim 7, further comprising a programmable-matched filter for despreading the received spread-spectrum signals.

9. The base band processor as set forth in claim 7, further comprising a correlator for despreading the received spread-spectrum signals.

10. The base band processor as set forth in claim 7, further comprising:

an analog-to-digital converter for converting the received spread-spectrum signals from an antenna to a digital signal; and

means responsive to the digital signal from the analog-to-digital converter for despreading the received spread-spectrum signals.

11. The base band processor as set forth in claim 10, further comprising:

means for processing the packets for spreading thereof; and

a digital-to-analog converter, coupled to the means for processing, for producing a modulated spread spectrum signal for transmission from the base station, wherein the means for processing and the digital-to-analog converter form at least a portion of the modulator of the wireless base station.

12. The base band processor as set forth in claim 7, further comprising:

means for processing the packets for spreading thereof; and

a digital-to-analog converter, coupled to the means for processing, for producing a modulated spread spectrum signal for transmission from the base station, wherein the means for processing and the digital-to-analog converter form at least a portion of the modulator of the wireless base station.

13. The base band processor as set forth in claim 7, further comprising a variable gain device, coupled to the packet formatter, for adjusting the level of the packets from the packet

formatter before application thereof to the modulator of the wireless base station.

14. A base band processor for use in a code-division-multiple-access (CDMA) wireless remote station, comprising:

an acknowledgment detector for detecting an acknowledgment in received spread-spectrum signals;

a data and control processor, for detecting and processing data and control information contained in the received spread-spectrum signals;

a encoder, for encoding data;

an interleaver, coupled to the encoder, for interleaving encoded data;

a preamble generator for generating coded preamble signals;

a multiplexer, coupled to the interleaver and to the preamble generator, for multiplexing the interleaved data and the coded preamble signals;

a packet formatter, coupled to the multiplexer, for formatting the multiplexed data and the coded preamble signals into packets; and

a controller coupled to the acknowledgment detector and to the packet formatter for controlling the modulator, the acknowledgment detector, the preamble generator, the multiplexer and the packet formatter, such that in operation the base band processor is for performing the following steps:

generating and outputting a plurality of packets comprising a sequence of coded preamble signals at sequentially increasing discrete power levels;

detecting an acknowledgement in a first received spread-spectrum signal;

upon detection of the acknowledgement, generating and outputting a packet comprising a collision detection preamble;

detecting in a second received spread-spectrum signal a base station collision detection preamble corresponding to the outputted collision detection preamble;

generating and outputting a packet comprising data and control information; and

processing any of data and control information in a third received spread-spectrum signal.

15. The base band processor as set forth in claim 14, further comprising a programmable-matched filter for despreading the received spread-spectrum signals.

16. The base band processor as set forth in claim 14, further comprising a correlator for despreading the received spread-spectrum signals.

17. The base band processor as set forth in claim 14, further comprising

an analog-to-digital converter for converting the received spread-spectrum signals from an antenna to a digital signal; and

means responsive to the digital signal from the analog-to-digital converter for despreading the received spread-spectrum signals.

18. The base band processor as set forth in claim 17, further comprising

means for processing the packets for spreading thereof; and

a digital-to-analog converter, coupled to the means for processing, for producing a modulated spread spectrum signal for transmission from the wireless remote station.

19. The base band processor as set forth in claim 14, further comprising

means for processing the packets for spreading thereof; and

a digital-to-analog converter, coupled to the means for processing, for producing a modulated spread spectrum signal for transmission from the wireless remote station.

20. The base band processor as set forth in claim 14, further comprising a variable gain device, coupled to the packet formatter, for adjusting the level of the packets from the packet formatter.--

REMARKS

The above amendment includes a number of editorial changes to the specification, similar to changes made in the allowed parent application. Applicants also have amended the claims to provide an appropriate set of claims for examination herein, and to insure adequate coverage of the inventive subject matter for this case. Upon entry of the amendments, claims 5-20 should be pending for examination in the form as shown above. Applicants solicit a prompt *favorable*

consideration of all of this continuation application.

To the extent necessary, if any, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

MCDERMOTT, WILL & EMERY

Keith E. George

Keith E. George
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Date: October 5, 2000
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Docket No.: 57042-036 **PATENT**

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of	:	
Emmanuel KANTERAKIS, et al.	:	
Serial No.: (Continuation of Serial No. 09/273,508)	:	Group Art Unit:
Filed: October 05, 2000	:	Examiner:
For: COMMON PACKET CHANNEL		

REQUEST FOR APPROVAL OF DRAWING AMENDMENT

Assistant Commissioner for Patents
Washington, DC 20231

Sir:

Approval of the changes made to Figure 4, as shown in red ink on the attached photocopies, is courteously solicited.

Respectfully submitted,

MCDERMOTT, WILL & EMERY

Keith E. George

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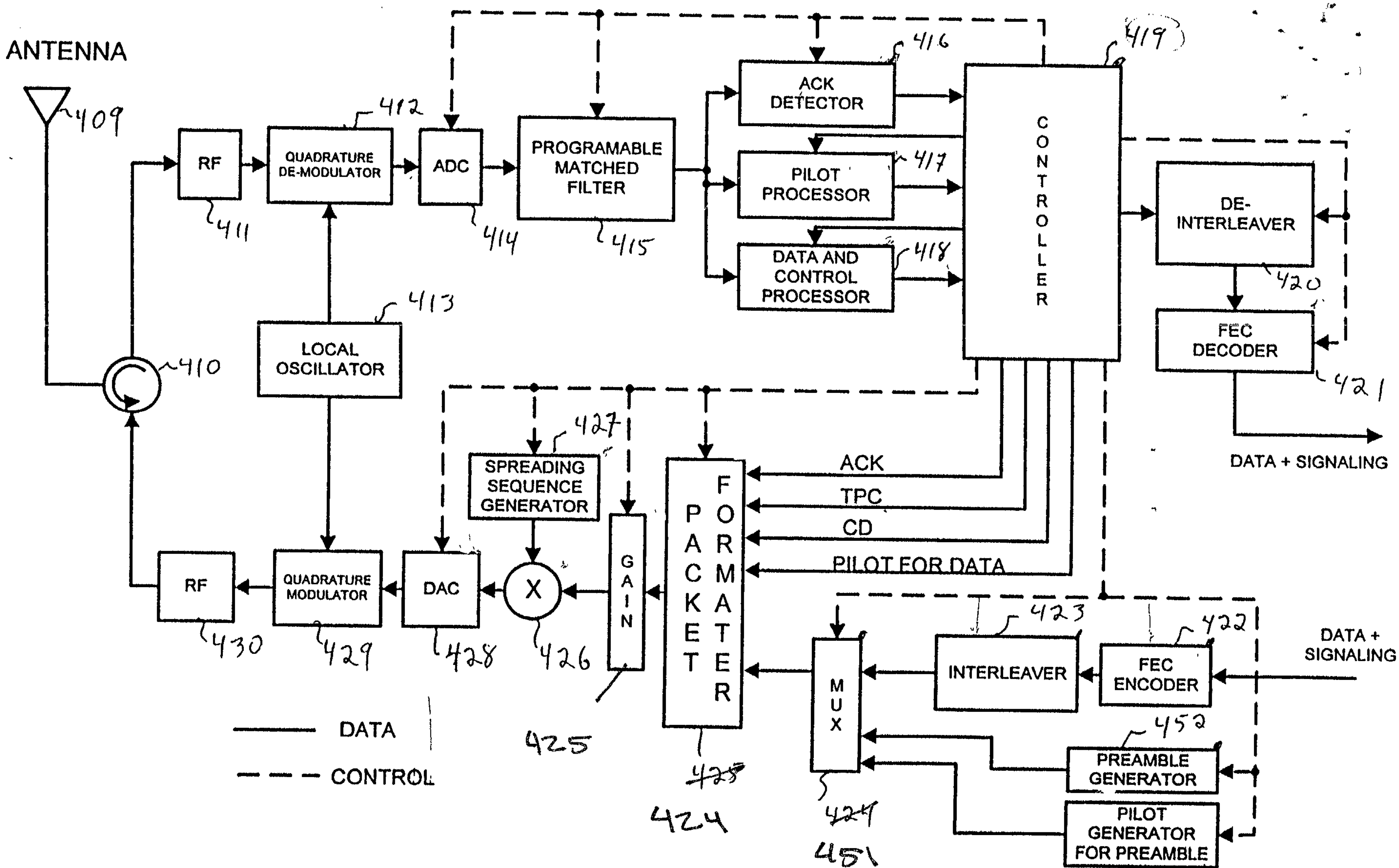
ANTENNA
409
RF
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QUADRATURE DE-MODULATOR
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PROGRAMABLE MATCHED FILTER
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LOCAL OSCILLATOR
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ACK DETECTOR
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PILOT PROCESSOR
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DATA AND CONTROL PROCESSOR
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CONTROLLER
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DE-INTERLEAVER
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FEC DECODER
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DATA + SIGNALING
SPREADING SEQUENCE GENERATOR
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PILOT FOR DATA
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QUADRATURE MODULATOR
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DAC
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426
MUX
451
INTERLEAVER
423
FEC ENCODER
422
DATA + SIGNALING
PREAMBLE GENERATOR
452
PILOT GENERATOR FOR PREAMBLE
453
DATA
CONTROL

FIG. 4

Attorney Docket: GBTI53US

UNITED STATES PATENT APPLICATION

of

EMMANUEL KANTERAKIS

and

KOUROSH PARSA

for

COMMON PACKET CHANNEL

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BACKGROUND OF THE INVENTION

This invention relates spread-spectrum communications, and more particularly to code-division-multiple-access (CDMA) cellular, packet-switched systems.

DESCRIPTION OF THE RELEVANT ART

Presently proposed for a standard is a random-access burst structure which has a preamble followed by a data portion. The preamble has 16 symbols, the preamble sequence, spread by an orthogonal Gold code. A mobile station acquires chip and frame synchronization, but no consideration is given to closed-loop power control or collision detection.

SUMMARY OF THE INVENTION

A general object of the invention is an efficient method for packet data transfer on CDMA systems.

Another object of the invention is high data throughput and low delay.

According to the present invention, as embodied and broadly described herein, an improvement to a code-division-multiple-access (CDMA) system employing spread-spectrum modulation, is provided. The CDMA system has a base station (BS) and a plurality of remote stations. The base station has BS-spread-spectrum transmitter and a BS-spread-spectrum receiver. Each of the plurality of remote stations has an RS-spread-spectrum transmitter and an RS-spread-spectrum receiver. The method comprises the steps of transmitting from BS-spread-spectrum

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transmitter, a broadcast common-synchronization channel. The broadcast common-synchronization channel has a common chip-sequence signal common to the plurality of remote stations. Further, the broadcast common-synchronization channel has a frame-timing signal.

a first RS-spread-spectrum receiver, located at a first remote station, the method includes the step of receiving the broadcast common-synchronization channel. From the received broadcast common-synchronization channel, the steps include determining frame timing at the first RS-spread-spectrum receiver from the frame-timing signal.

At a first RS-spread-spectrum transmitter, located at the first remote station, the steps include transmitting an access-burst signal. The access-burst signal has a plurality of segments. A segment is an interval in time of the access-burst signal. Each segment has a preamble followed by a pilot signal. The plurality of segments preferably also has a plurality of power levels, respectively. Preferably, the plurality of power levels increase sequentially, with each segment.

At the BS spread-spectrum receiver the steps include receiving the access-burst signal at a detected-power level. In response to receiving the access-burst signal, from the BS-spread-spectrum transmitter, the steps include transmitting to the first RS-spread-spectrum receiver an acknowledgment signal.

At the first RS-spread-spectrum receiver the steps include receiving the acknowledgment signal. In response to receiving the acknowledgment signal, the steps include transmitting from

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the first RS-spread-spectrum transmitter, to said BS-spread-spectrum receiver, a spread-spectrum signal having data.

Additional objects and advantages of the invention are set forth in part in the description which follows, and in part are obvious from the description, or may be learned by practice of the invention. The objects and advantages of the invention also may be realized and attained by means of the instrumentalities and combinations particularly pointed out in the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings, which are incorporated in and constitute a part of the specification, illustrate preferred embodiments of the invention, and together with the description serve to explain the principles of the invention.

FIG. 1 is a common packet channel system block diagram with a common control downlink channel;

FIG. 2 is common packet channel system block diagram with a dedicated downlink channel;

FIG. 3 is a block diagram of a base station receiver and transmitter for common packet channel;

FIG. 4 is a block diagram of a mobile station receiver and transmitter for common packet channel;

FIG. 5 is a timing diagram for access burst transmission;

FIG. 6 illustrates common packet channel access burst of FIG. 5 using a common control downlink channel;

FIG. 7 illustrates common packet channel access of FIG. 5

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using a dedicated downlink channel

FIG. 8 shows the structure of the preamble;

FIG. 9 illustrates preamble and pilot formats;

FIG. 10 is a common packet channel timing diagram and frame format of the down link common control link; and

FIG. 11 illustrates frame format of common packet channel, packet data.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Reference now is made in detail to the present preferred embodiments of the invention, examples of which are illustrated in the accompanying drawings, wherein like reference numerals indicate like elements throughout the several views.

The common-packet channel is a new and novel uplink transport channel for transmitting variable size packets from a mobile station to a base sation within listening range, without the need to obtain a two way link with any one or set of base stations. The channel resource allocation is contention based; that is, a number of mobile stations could at any time content for the same resources, as found in an ALOHA system.

In the exemplary arrangement shown in FIG. 1, common-packet channel provides an improvement to a code-division-multiple-access (CDMA) system employing spread-spectrum modulation. The CDMA system has a plurality of base stations (BS) 31, 32, 33 and a plurality of remote stations (RS). Each remote station 35 has an RS-spread-spectrum transmitter and an RS-spread-spectrum

receiver. An uplink is from the remote station 35 to a base station 31. The uplink has the common-packet channel (CPCH). A downlink is from a base station 31 to the remote station 35, and is denoted a common-control channel (CCCH). The common-control channel has common signaling used by the plurality of remote stations.

An alternative to the common-control channel, but still using the common-packet channel, is the downlink dedicated physical channel (DPCH), shown in FIG. 2. The dedicated downlink channel, has signaling that is used for controlling a single remote station.

As illustratively shown in FIG. 3, a BS spread-spectrum transmitter and a BS spread-spectrum receiver is shown. The BS spread-spectrum transmitter and the BS spread-spectrum receiver are located at the base station 31. The BS spread-spectrum receiver includes an antenna 309 coupled to a circulator 310, a receiver radio frequency (RF) section 311, a local oscillator 313, a quadrature demodulator 312, and an analog-to-digital converter 314. The receiver RF section 311 is coupled between the circulator 310 and the quadrature demodulator 312. The quadrature demodulator is coupled to the local oscillator 313 and to the analog to digital converter 314. The output of the analog-to-digital converter 315 is coupled to a programmable-matched filter 315.

A preamble processor 316, pilot processor 317 and data-and-

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control processor 318 are coupled to the programmable-matched filter 315. A controller 319 is coupled to the preamble processor 316, pilot processor 317 and data-and-control processor 318. A de-interleaver 320 is coupled between the controller 319 and a forward-error-correction (FEC) decoder 321.

The BS spread-spectrum transmitter includes a forward-error-correction (FEC) encoder 322 coupled to an interleaver 323. A packet formatter 324 is coupled to the interleaver 323 and to the controller 319. A variable gain device 325 is coupled between the packet formatter 324 and a product device 326. A spreading-sequence generator 327 is coupled to the product device 326. A digital-to-analog converter 328 is coupled between the product device 328 and quadrature modulator 329. The quadrature modulator 329 is coupled to the local oscillator 313 and a transmitter RF section 330. The transmitter RF section 330 is coupled to the circulator 310.

The controller 319 has control links coupled to the analog-to-digital converter 314, programmable-matched filter 315, preamble processor 316, the digital-to-analog converter 328, the spreading sequence generator 327, the variable gain device 325, the packet formatter 324, the de-interleaver 320, the FEC decoder 321, the interleaver 323 and the FEC encoder 322.

A received spread-spectrum signal from antenna 309 passes through circulator 310 and is amplified and filtered by receiver RF section 311. The local oscillator 313 generates a local

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signal which quadrature demodulator 312 uses to demodulator in-phase and quadrature phase components of the received spread-spectrum signal. The analog-to-digital converter 314 converts the in-phase component and the quadrature-phase component to a digital signal. These functions are well known in the art, and variations to this block diagram can accomplish the same function.

The programmable-matched filter 315 despreads the received spread-spectrum signal. A correlator, as an alternative, may be used as an equivalent means for despeading the received spread-spectrum signal.

The preamble processor 316 detects the preamble portion of the received spread-spectrum signal. The pilot processor detects and synchronizes to the pilot portion of the received spread-spectrum signal. The data and control processor detects and processes the data portion of the received spread-spectrum signal. Detected data passes through the controller 319 to the de-interleaver 320 and FEC decoder 321. Data and signaling are outputted from the FEC decoder 321.

In the BS transmitter, data are FEC encoded by FEC encoder 322, and interleaved by interleaver 323. The packet formatter formats data, signaling, acknowledgment signal, collision detection signal, pilot signal and transmitting power control (TPC) signal into a packet. The packet is outputted from packet formatter, and the packet level is amplified or attenuated by

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variable gain device 325. The packet is spread-spectrum processed by product device 326, with a spreading chip-sequence from spreading-sequence generator 327. The packet is converted to an analog signal by digital-to-analog converter 328, and in-phase and quadrature-phase components are generated by quadrature modulator 329 using a signal from local oscillator 313. The packet is translated to a carrier frequency, filtered and amplified by transmitter RF section 330, and then passes through circulator 310 and is radiated by antenna 309.

In the illustrative embodiment shown in FIG. 4, a MS spread-spectrum transmitter and a MS spread-spectrum receiver are shown. The MS spread-spectrum transmitter and the MS spread-spectrum receiver are located at the mobile station 35, shown in FIG 1. The MS spread-spectrum receiver includes an antenna 409 coupled to a circulator 410, a receiver radio frequency (RF) section 411, a local oscillator 413, a quadrature demodulator 412, and an analog-to-digital converter 414. The receiver RF section 411 is coupled between the circulator 410 and the quadrature demodulator 412. The quadrature demodulator is coupled to the local oscillator 413 and to the analog to digital converter 414. The output of the analog-to-digital converter 415 is coupled to a programmable-matched filter 415.

An acknowledgment detector 416, pilot processor 417 and data-and-control processor 418 are coupled to the programmable-matched filter 415. A controller 419 is coupled to the

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acknowledgment detector 416, pilot processor 417 and data-and-control processor 418. A de-interleaver 420 is coupled between the controller 419 and a forward-error-correction (FEC) decoder 421.

The MS spread-spectrum transmitter includes a forward-error-correction (FEC) encoder 422 coupled to an interleaver 423. A packet formatter 424 is coupled through a multiplexer 451 to the interleaver 423 and to the controller 419. A preamble generator 452 and a pilot generator 453 for the preamble are coupled to the multiplexer 451. A variable gain device 425 is coupled between the packet formatter 424 and a product device 426. A spreading-sequence generator 427 is coupled to the product device 426. A digital-to-analog converter 428 is coupled between the product device 428 and quadrature modulator 429. The quadrature modulator 429 is coupled to the local oscillator 413 and a transmitter RF section 430. The transmitter RF section 430 is coupled to the circulator 410.

The controller 419 has control links coupled to the analog-to-digital converter 414, programmable-matched filter 415, acknowledgment detector 416, the digital-to-analog converter 428, the spreading sequence generator 427, the variable gain device 425, the packet formatter 424, the de-interleaver 420, the FEC decoder 421, the interleaver 423, the FEC encoder 422, the preamble generator 452 and the pilot generator 453.

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A received spread-spectrum signal from antenna 409 passes through circulator 410 and is amplified and filtered by receiver RF section 411. The local oscillator 413 generates a local signal which quadrature demodulator 412 uses to demodulate in-phase and quadrature phase components of the received spread-spectrum signal. The analog-to-digital converter 414 converts the in-phase component and the quadrature-phase component to a digital signal. These functions are well known in the art, and variations to this block diagram can accomplish the same function.

The programmable-matched filter 415 despreads the received spread-spectrum signal. A correlator, as an alternative, may be used as an equivalent means for despeading the received spread-spectrum signal.

The acknowledgment detector 416 detects the an acknowledgment in the received spread-spectrum signal. The pilot processor detects and synchronizes to the pilot portion of the received spread-spectrum signal. The data and control processor detects and processes the data portion of the received spread-spectrum signal. Detected data passes through the controller 419 to the de-interleaver 420 and FEC decoder 421. Data and signaling are outputted from the FEC decoder 421.

In the MS transmitter, data are FEC encoded by FEC encoder 422, and interleaved by interleaver 423. The preamble generator 452 generates a preamble and the pilot generator 453 generates a

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pilot for the preamble. The multiplexer 451 multiplexes the data, preamble and pilot, and the packet formatter 424 formats the preamble, pilot and data into a common-packet channel packet. Further, the packet formatter formats data, signaling, acknowledgment signal, collision detection signal, pilot signal and TPC signal into a packet. The packet is outputted from packet formatter, and the packet level is amplified or attenuated by variable gain device 425. The packet is spread-spectrum processed by product device 426, with s spreading chip-sequence from spreading-sequence generator 427. The packet is converted to an analog signal by digital-to-analog converter 428, and in-phase and quadrature-phase components are generated by quadrature modulator 429 using a signal from local oscillator 413.

Referring to FIG. 5, the base station transmits a common-synchronization channel, which has a frame time duration T_F. The common-synchronization channel has a common chip-sequence signal, which is common to the plurality of remote stations communicating with the particular base station. In a particular embodiment, the time T_F of one frame is ten milliseconds. Within one frame, there are eight access slots. Each access slot lasts 1.25 milliseconds. Timing for the access slots is the frame timing, and the portion of the common-synchronization channel with the frame timing is denoted the frame-timing signal. The frame-timing signal is the timing a remote station

uses in selecting an access slot in which to transmit an access-burst signal.

A first remote station attempting to access the base station, has a first RS-spread-spectrum receiver for receiving the common synchronization channel, broadcast from the base station. The first RS-spread-spectrum receiver determines frame timing from the frame-timing signal.

A first RS-spread-spectrum transmitter, located at the first remote station, transmits an access-burst signal. An access burst signal, as shown in FIG. 5, starts at the beginning of an access slot, as defined by the frame timing portion of the common-synchronization channel.

FIG. 6 illustratively shows the common-packet channel access burst format, for each access-burst signal. Each access-burst signal has a plurality of segments. Each segment has a preamble followed by a pilot signal. The plurality of segments has a plurality of power levels, respectively. More particularly, the power level of each segment increases with each subsequent segment. Thus, a first segment has a first preamble and pilot, at a first power level P_0. A second segment has a second preamble and a second pilot, at a second power level P_1. The third segment has a third preamble and a third pilot at a third power level P_2. The first preamble, the second preamble, the third preamble, and subsequent preambles, may be identical or different. The power level of the pilot preferably

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is less than the power level of the preamble. A preamble is for synchronization, and a corresponding pilot, which follows a preamble, is to keep the BS spread-spectrum receiver receiving the spread-spectrum signal from the remote station, once a preamble is detected.

A subsequent increase or decrease of power levels is basically a closed loop power control system. Once a BS spread-spectrum receiver detects a preamble from the remote station, the BS spread-spectrum transmitter sends an acknowledgment (ACK) signal.

Referring to FIG. 4, the preamble is generated by preamble generator 452 and the pilot is generated by pilot generator 453. A preamble format is shown in FIG. 8. The preamble format with a pilot is shown in FIG. 9. The multiplexer 451, with timing from the controller 419, selects the preamble then a corresponding pilot, for packet formatter 424. A series of preambles and pilots may be generated and made as part of the packet by packet formatter 424. The preambles and pilots can have their power level adjusted either in the preamble generator 452 and pilot generator 453, or by the variable gain device 425.

The BS spread-spectrum receiver receives the access-burst signal at a detected-power level. More particularly, the access-burst signal has the plurality of preambles at a plurality of power levels, respectively. When a preamble with sufficient power level is detected at the BS spread-spectrum

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receiver, then an acknowledgment (ACK) signal is transmitted from the BS spread-spectrum transmitter. The ACK signal is shown in FIG. 6, in response to the fourth preamble having sufficient power for detection by the BS spread-spectrum receiver.

FIG. 3 shows the preamble processor 316 for detecting the preamble and the pilot processor 317 for continuing to receive the packet after detecting the preamble. Upon detecting the preamble, the processor 319 initiates an ACK signal which passes to packet formatter 324 and is radiated by the BS spread-spectrum transmitter.

The first RS-spread-spectrum receiver receives the acknowledgment signal. Upon receiving the ACK signal, the first RS-spread-spectrum transmitter transmits to the BS-spread-spectrum receiver, a spread-spectrum signal having data. The data is shown in FIG. 6, in time, after the ACK signal. The data includes a collision detection (CD) portion of the signal, referred to herein as a collision detection signal, and message.

In response to each packet transmitted from the MS spread-spectrum transmitter, the BS receiver detects the collision detection portion of the data, and retransmits the data field of the collision detection portion of the data to the remote station. Fig. 10 shows the timing diagram for re-transmitting the collision detection field. There are several slots for collision detection retransmission, which can be used for re-

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transmitting the collision detection field for several remote stations. If the collision detection field were correctly re-transmitted to the remote station, then the remote station knows its packet is successfully received by the base station. If the collision detection field were not correctly re-transmitted by the base station, then the remote station assumes there is a collision with a packet transmitted by another remote station, and stops further transmission of the data.

FIG. 11 shows a frame format of a common-packet channel data payload.

In operation, an overview of the way this transport mechanism is used is as follows. A remote station (RS) upon power up searches for transmission from nearby base stations. Upon successful synchronization with one or more base stations, the Remote station receives the necessary system parameters from a continuously transmitted by all base stations broadcast control channel (BCCH). Using the information transmitted from the BCCH, the remote station can determine various parameters required when first transmitting to a base station. Parameters of interest are the loading of all the base station in the vicinity of the remote station, their antenna characteristics, spreading codes used to spread the downlink transmitted information, timing information and other control information. With this information, the bemote station can transmit specific waveforms in order to capture the attention of a nearby base

station. In the common packet channel the remote station, having all the necessary information from the nearby base station, it starts transmitting a particular preamble from a set of predefined preambles, at a well selected time intervals. The particular structure of the preamble waveforms is selected on the basis that detection of the preamble waveform at the base station is to be as easy as possible with minimal loss in detectability.

The physical common packet channel (CPCH) is used to carry the CPCH. It is based on the well known Slotted ALOHA approach. There is a number of well defined time offsets relative to the frame boundary of a downlink received BCCH channel. These time offsets define access slots. The number of access slots is chosen according to the particular application at hand. As an example, shown in Fig. 5, eight access slots are spaced 1.25 msec apart in a frame of 10-msec duration.

According to FIG. 5, a remote station picks an access slot in a random fashion and tries to obtain a connection with a base station by transmitting a preamble waveform. The base station is able to recognize this preamble, and is expecting its reception at the beginning of each access slot. The length of the access burst is variable and the length of the access burst is allowed to vary from a few access slots to many frame durations. The amount of data transmitted by the remote station could depend on various factors. Some of those are: class capability of the

remote station, prioritization, the control information transmitted down by the base station, and various bandwidth management protocols residing and executed at the base station. A field at the beginning of the data portion signifies the length of the data.

The structure of the access burst is shown in FIG. 6. The access burst starts with a set of preambles of duration T_p whose power is increased in time from preamble to preamble in a step-wise manner. The transmitted power during each preamble is constant. For the duration T_D between preambles the access burst consists of a pilot signal transmitted at a fixed power level ratio relative to the previously transmitted preamble. There is a one to one correspondence between the code structure of the preamble and the pilot signal. The pilot signal could be eliminated by setting it to a zero power level.

The transmission of the preambles seizes because either the preamble has been picked up, detected, by the base station, and the base station has responded to the remote station with a layer one acknowledgment L1 ACK which the remote station has also successfully received. Transmission of the preamble seizes also if the remote station has transmitted the maximum allowed number of preambles M_p. Upon receiving this L1 ACK the remote station starts transmission of its data. Once the remote station has transmitted more than M_p preambles, it undergoes a forced random back off procedure. This procedure forces the

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remote station to delay its access burst transmission for a later time. The random back off procedure could be parameterized based on the priority statues of the Remote station. The amount by which the power is increased from preamble to preamble is D_p which is either fixed for all cells at all times or it is repeatedly broadcast via the BCCH. Remote stations with different priorities status could use a power increase which depends on a priority status assigned to the remote station. The priority status could be either predetermined or assigned to the remote station after negotiation with the base station.

The Preamble Signal Structure

There is a large set of possible preamble waveforms. Every base station is assigned a subset of preambles from the set of all preamble waveforms in the system. The set of preambles a base station is using is broadcast through it's BCCH channel. There are many ways of generating preamble waveforms. One existing way is to use a single orthogonal Gold code per preamble from the set of all possible orthogonal Gold codes of length L. A preamble could then be constructed by repeating the Gold code a number of times N to transmit a length N complex sequence. For example if A denotes the orthogonal Gold code and $G_i = \{g_{i,0}\ g_{i,1}\ g_{i,2}\ \ldots\ g_{i,N-1}\}$, a length N complex sequence, then a preamble could be formed as shown in Fig. 8, where, $g_{i,j}$, j=0,

…, N-1, multiplies every element in A. Normally the sets of G_i's are chosen to be orthogonal to each other. This will allow for a maximum of N possible waveforms. The total number of possible preambles is then L*N.

The preferred approach is to use different codes rather than a single repeating code in generating each preamble. In that case, if L possible codes, not necessarily Gold Codes, were possible, designated by A_0, A_1, … A_{L-1}, then possible preambles will be as shown in Fig. 8. The order of the A_i's can be chosen so that identical codes are not used in the same locations for two different preambles. A similar approach could be used to form the pilot signals.

The Downlink Common Control Channel

In Fig 10, the downlink common control channel structure for even and odd slots is shown. The even slots contain reference data and control data. The pilot symbols are used to derive a reference for demodulating the remaining control symbols. The control symbols are made of transport frame indicator (TFI) symbols, power control (PC) symbols, collision detection (CD) symbol and signaling symbols (SIG). The odd slots contain all the information that the even slots contain plus an acknowledgment (ACK) signal. Odd slots do not include collision detection fields.

The uplink CPCH is shown over the last transmitted

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preamble. After the last transmitted preamble, the base station has successfully detected the transmission of the last transmitted preamble and transmits back the acknowledgment signal. During the same time, the remote station is tuned to receive the ACK signal. The ACK signal transmitted corresponds to the specific preamble structure transmitted on the uplink. Once the remote station detects the ACK signal corresponding to transmitted preamble by the remote station, the remote station begins transmission of its data.

Corresponding with the preamble structure in the uplink there is a corresponding in time power control information symbol and a corresponding in time collision detection field. Upon start of data transmission the remote station uses the downlink transmitted power control information to adjust its transmitted power. The power control symbols are decoded to derive a binary decision data, which is then used to increase or decrease the transmitted power accordingly. Figure 11 shows the structure of the uplink frame and the slot format for the data portion of the uplink transmission. Data and control information is transmitted in an in-phase and quadrature-phase multiplexed format. That is, the data portion could be transmitted on the in-phase coordinate and the control portion on the quadrature-phase coordinate. The modulation for the data and control is BPSK. The control channel contains the information for the receiver to enable the demodulation of the

data. The control channel provides for upper layer system functionality. The data portion consists of one or more frames. Each frame consists of a number of slots. As an example the frame duration could be 10 milliseconds long and the slot duration 0.625 milliseconds long. In that case, there are 16 slots per frame. The beginning of the data payload contains a collision detection field used to relay information about the possibility of collision with other simultaneously transmitting remote stations. The collision detection field is read by the base station. The base station expects the presence of the collision detection field since it had provided an ACK signal at the last time slot.

The collision detection field includes a temporary identification (ID) number chosen at random by the mobile for the transmission of the current packet. The base station reads the collision detection field and reflects, or transmits back, the collision detection field on the downlink. If the collision detection field detected by the remote station matched the one just being transmitted by the same remote station, then the collision detection field is an identification that the transmission is being received correctly. The remote station then continues transmitting the remaining of the packet. In case the collision detection field has not been received correctly by the remote station, then the remote station considers the packet reception by the base station as erroneous

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and discontinues transmission of the remaining packet.

The function of the remaining fields are as follows. The Pilot field enables the demodulation of both the data and control bits. The transmitted power control (TPC) bits are used to control the power of a corresponding downlink channel, in case a down link channel directed to the same user is operational. If the downlink channel were not operational, then the TPC control bits can be used to relay additional pilot bits instead.

The Rate Information (RI) field is used to provide the transmitter with the ability to change its data rate without the necessity to explicitly negotiate the instantaneous data rate with the base station. The service field provides information of the particular service the data bits are to be used for. The length field specifies the time duration of the packet. The signal field can be used to provide additional control information as required.

Additional functionalities of the common packet channel are: (1) bandwidth management and (2) L2 acknowledgment mechanism.

The bandwidth management functionality is implemented via signaling information on the down link common control channel. There are three ways for incorporating this functionality. The first relies on changing the priority status of all uplink users, which currently are transmitting information using the

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CPCH. By this method all the users are remapping their priority status via a control signal sent at the downlink. When the priority of the CPCH users is lowered their ability to capture an uplink channel is lowered. Thus the amount of data sent on the uplink by the CPCH users is thus reduced. The other mechanism is for the base station to relay the maximum possible data rate the CPCH users are allowed to transmit. This prevents the CPCH users from transmitting at a rate which could possibly exceed the uplink system capacity and therefore take the cell down, i.e., disrupt the communication for all users currently connected to the base station. For the third method, the base station could provide a negative acknowledgment through the ACK signal. In this case, any remote station which is tuned to receive the ACK signal is prohibited from further transmission of an access-burst signal.

The L2 acknowledgment (L2 ACK) mechanism, which is different than the L1 ACK, is used by the base station to notify the remote station for the correctness of an uplink packet reception. The base station could either relay to the remote station which portions of the packet have being received correctly or which have being received incorrectly. There are many existing ways of implementing a particular protocol to relay this type of information. For example, the packet could be identified as consisting of a number of frames, with each frame consisting of a number of sub-frames. The frames are

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identified by a predetermined number. The sub-frames in each frame are also identified by a specific number. One way for the base to relay the information about the correctness of the packet is to identify all the frames and sub-frames that have been received correctly. Another way is to identify the frames and sub-frames that have been received in error. The way the base station could identify the correctness of a frame or sub-frame is by checking its cyclic residue code (CRC) field. Other more robust mechanisms for acknowledgment may be used. For example, a negative acknowledgment may be part of the common packet channel. The base station could send a negative acknowledgment (ACK), as part of the L1 ACK, in order to force the remote station from transmitting the message part.

CD Operation

There are many remote stations that might try to access the base station at the same time. There is a number of different preamble signals which a remote station can use for reaching the base station. Each remote station chooses at random one of the preamble signals to use for accessing the base station. The base station transmits a broadcast common synchronization channel. This broadcast common synchronization channel includes a frame timing signal. The remote stations extract the frame timing transmitted by the base station by receiving the broadcast common synchronization channel. The frame timing is used by the remote stations to derive a timing schedule by

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dividing the frame duration in a number of access slots. The remote stations are allowed to transmit their preambles only at the beginning of each access slot. The actual transmit times for different remote stations could be slightly different due to their different propagation delays. This defines an access protocol commonly known as the slotted ALOHA access protocol. Each remote station repeatedly transmits its preamble signal until the base station detects the preamble, acknowledges that the preamble is received, and the acknowledgment is correctly received by the remote station. There could be more than one remote station transmitting the same preamble signal in the same access slot. The base station cannot recognize if two or more remote stations were transmitting the same preamble in the same access slot. When the base station detects the transmission of a preamble signal, it transmits back an acknowledgment message. There is one acknowledgment message corresponding to each possible preamble signal. Therefore, the are as many acknowledgment messages as there are preamble signals. Every transmitting remote station which receives an acknowledgment message corresponding to its transmitting preamble signal, will start transmitting its message. For each preamble signal, there is a corresponding spreading code used by the base station to transmit the message. The message transmission always starts at the beginning of an access slot. Since there could be a number of remote stations using the same preamble signal in the same access slot, they start transmitting their message at the same time using the same spreading code. In that case, the

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transmissions of the remote stations likely interferes with each other and thus is not received correctly.

Each remote station includes a collision detection (CD) field in the beginning of the transmitted message. The CD field is chosen at random by each remote station and independently from each other Remote Station. There is a predefined limited number of CD fields. Two remote stations transmitting their message at the same time most likely chose a different CD field. When the base station receives the CD field, the base station reflects back, transmits back, the CD field to the remote station. The remote station reads the reflected CD field by the base station. If the reflected CD field matched the the CD field the remote station transmitted, the the remote station assumes that the remote station is being received correctly by the base station and continue transmitting the rest of the message, or data. If the reflected CD field from the base station did not match the one transmitted by the remote station, then the remote station assumes that there has been a collision and stops transmitting the remaining message or data.

It will be apparent to those skilled in the art that various modifications can be made to the common packet channel of the instant invention without departing from the scope or spirit of the invention, and it is intended that the present invention cover modifications and variations of the common packet channel provided they come within the scope of the

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appended claims and their equivalents.

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WE CLAIM:

1. An improvement to a code-division-multiple-access (CDMA) system employing spread-spectrum modulation, with the CDMA system having a base station (BS) with a BS-spread-spectrum transmitter and a BS-spread-spectrum receiver, and a plurality of remote stations, with each remote station (RS) having an RS-spread-spectrum transmitter and an RS-spread-spectrum receiver, the method comprising the steps of:

transmitting from said BS-spread-spectrum transmitter located at said base station, a broadcast common-synchronization channel having a common chip-sequence signal common to the plurality of remote stations, the broadcast common-synchronization channel having a frame-timing signal;

receiving at a first RS-spread-spectrum receiver the broadcast common-synchronization channel, and determining frame timing at said first RS-spread-spectrum receiver from the frame-timing signal;

transmitting from a first RS-spread-spectrum transmitter an access-burst signal, the access-burst signal having a plurality of segments, with each segment having a preamble followed by a pilot signal, with the plurality of segments having a plurality of power levels, respectively;

receiving at said BS spread-spectrum receiver the access-burst signal at a detected-power level;

transmitting from said BS-spread-spectrum transmitter

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to said first RS-spread-spectrum receiver, responsive to the access-burst signal, an acknowledgment signal;

receiving at said first RS-spread-spectrum receiver the acknowledgment signal; and

transmitting from said first RS-spread-spectrum transmitter, responsive to the acknowledgment signal, to said BS-spread-spectrum receiver, a spread-spectrum signal having data.

2. The improvement as set forth in claim 1 with the step of transmitting from the first RS-spread-spectrum transmitter the access-burst signal, including the step of transmitting the access-burst signal with the plurality of segments having the plurality of power levels increasing sequentially, respectively.

3. An improvement to a code-division-multiple-access (CDMA) system employing spread-spectrum modulation, with the CDMA system having a base station (BS) and a plurality of remote stations (RS) with each remote station having an RS-spread-spectrum transmitter and an RS-spread-spectrum receiver, the improvement comprising:

a BS spread-spectrum transmitter located at said base station, for transmitting a broadcast common-

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synchronization channel having a common chip-sequence signal common to the plurality of remote stations, the broadcast common-synchronization channel having a frame-timing signal;

a first RS-spread-spectrum receiver, located at a first remote station of the plurality of remote stations, for receiving the broadcast common-synchronization channel, and determining frame timing at said first RS-spread-spectrum receiver from the frame-timing signal;

a first RS-spread-spectrum transmitter, located at said first remote station of said plurality of remote stations, for transmitting an access-burst signal, the access-burst signal having a plurality of segments, with each segment having a preamble followed by a pilot signal, with the plurality of segments having a plurality of power levels, respectively;

said BS spread-spectrum receiver for receiving the access-burst signal at a detected-power level;

said BS-spread-spectrum transmitter for transmitting to said first RS-spread-spectrum receiver, responsive to receiving the access-burst signal, an acknowledgment signal;

said first RS-spread-spectrum receiver for receiving the acknowledgment signal; and

said first RS-spread-spectrum transmitter, responsive to the acknowledgment signal, for transmitting to said BS-spread-spectrum receiver, a spread-spectrum signal having data.

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4. The improvement as set forth in claim 3 with said first RS-spread-spectrum transmitter including transmitting the access-burst signal with the plurality of segments having the plurality of power levels increasing sequentially, respectively.

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ABSTRACT

An improvement to a code-division-multiple-access (CDMA) system employing spread-spectrum modulation, with the CDMA system having a base station (BS) and a plurality of remote stations. The base station has a BS-spread-spectrum transmitter and a BS-spread-spectrum receiver. A remote station has an RS-spread-spectrum transmitter and an RS-spread-spectrum receiver. The BS transmitter transmits a broadcast common-synchronization channel, which includes a frame-timing signal. The broadcast common-synchronization channel has a common chip-sequence signal, which is common to the plurality of remote stations. In response to the RS-spread-spectrum receiver receiving the broadcast common-synchronization channel, and determining frame timing from the frame-timing signal, an RS-spread-spectrum transmitter transmits an access-burst signal. The BS-spread-spectrum transmitter, responsive to the BS-spread-spectrum receiver receiving the access-burst signal, transmits an acknowledgment signal. In response to the first RS-spread-spectrum receiver receiving the acknowledgment signal, the first RS-spread-spectrum transmitter transmits a spread-spectrum signal having data.

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Docket No.: 57042-036 **PATENT**

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of	:	
Emmanuel KANTERAKIS, et al.	:	
Serial No.: (Continuation of Serial No. 09/273,508)	:	Group Art Unit:
Filed: October 05, 2000	:	Examiner:
For: COMMON PACKET CHANNEL		

TRANSMITTAL OF FORMAL DRAWINGS

Assistant Commissioner for Patents
Washington, DC 20231

Sir:

Eleven (11) sheets of formal drawings are submitted herewith as filed in parent application Serial No. 09/273,508.

Respectfully submitted,

MCDERMOTT, WILL & EMERY

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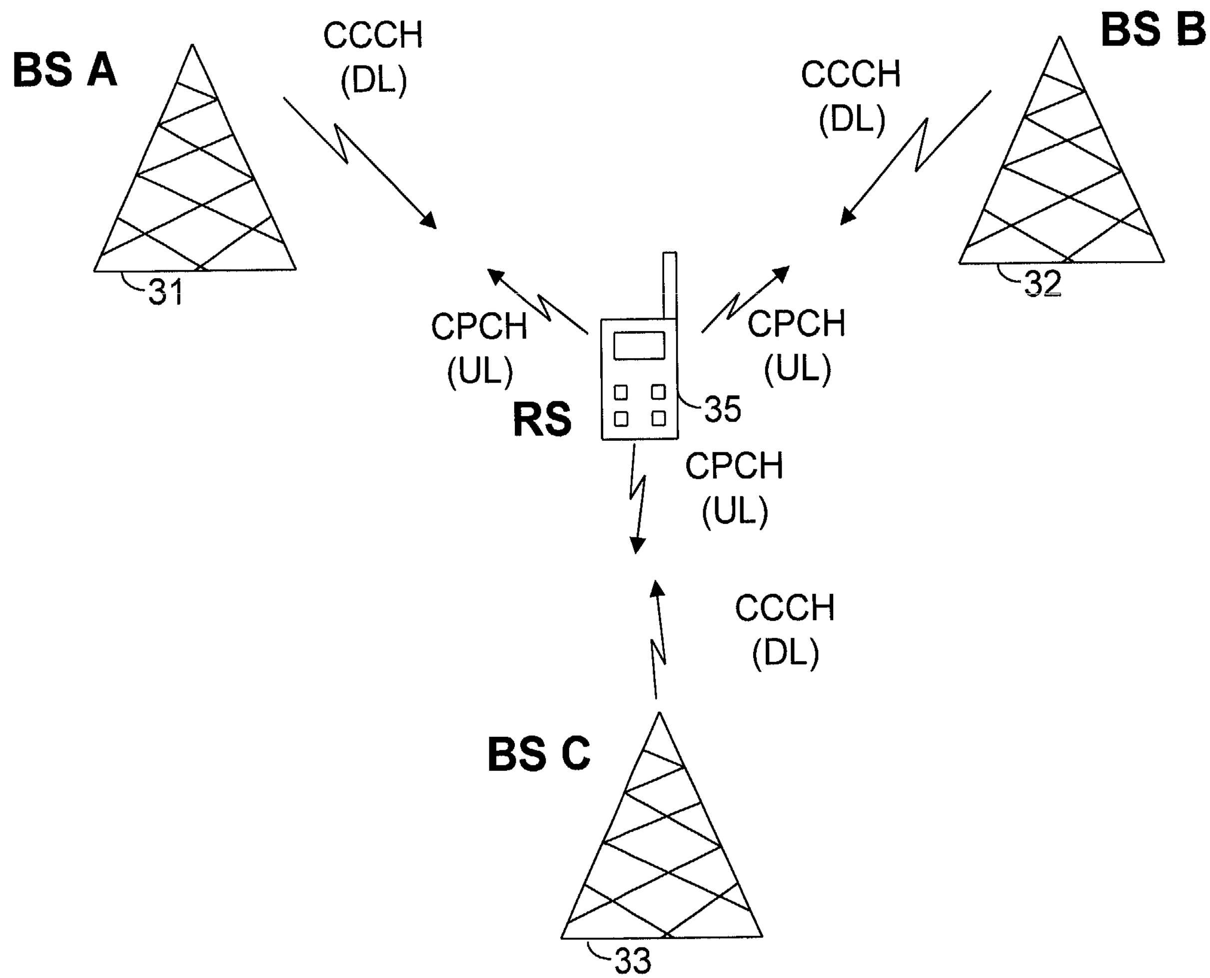
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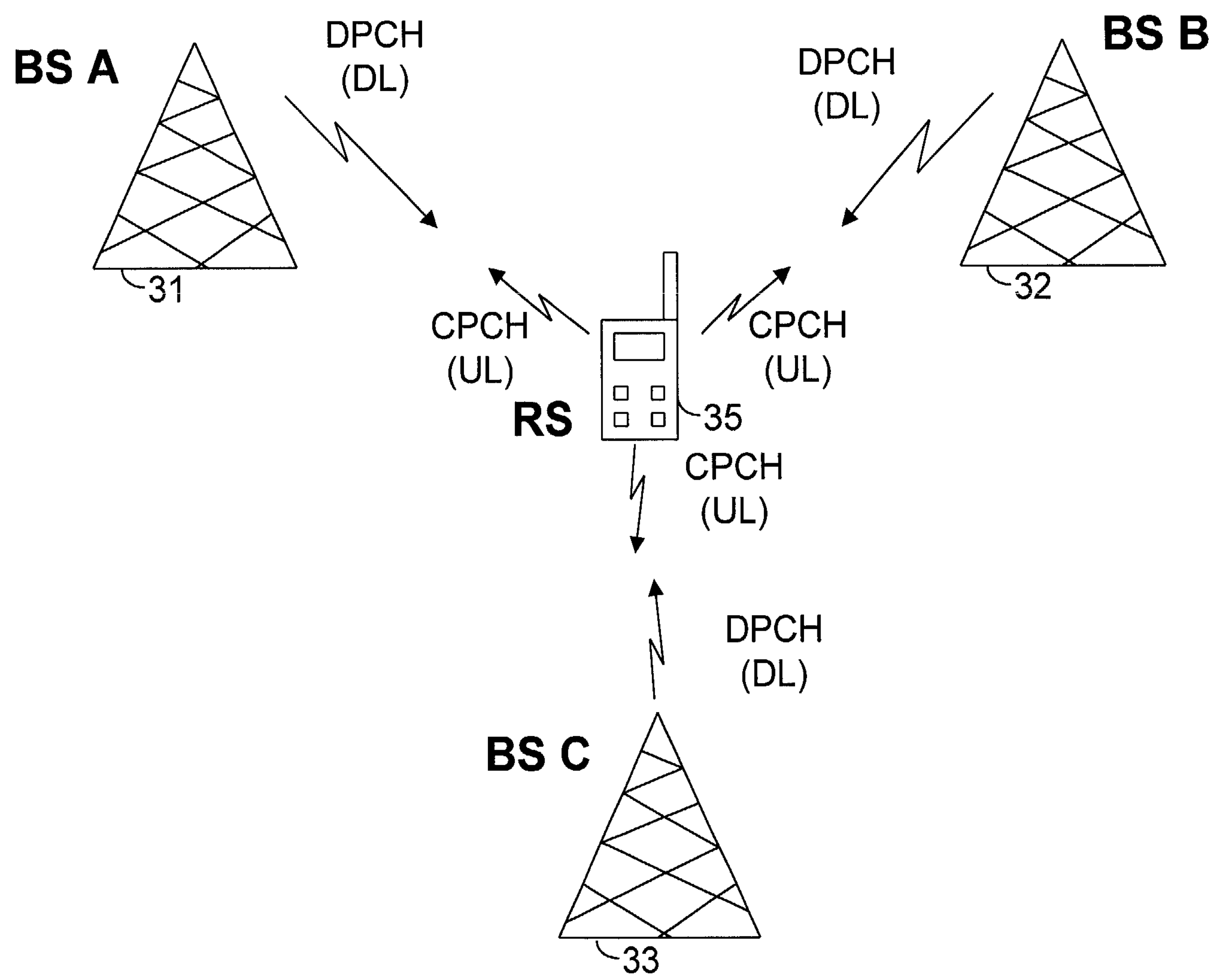
31
CCCH
(DL)
BS B
32
CCCH
(DL)
CPCH
(UL)
CPCH
(UL)
RS
35
CPCH
(UL)
CCCH
(DL)
BS C
33

FIG. 1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DPCH
(DL)
31
DPCH
(DL)
BS B
32
CPCH
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CPCH
(UL)
RS
35
CPCH
(UL)
DPCH
(DL)
BS C
33

FIG. 2

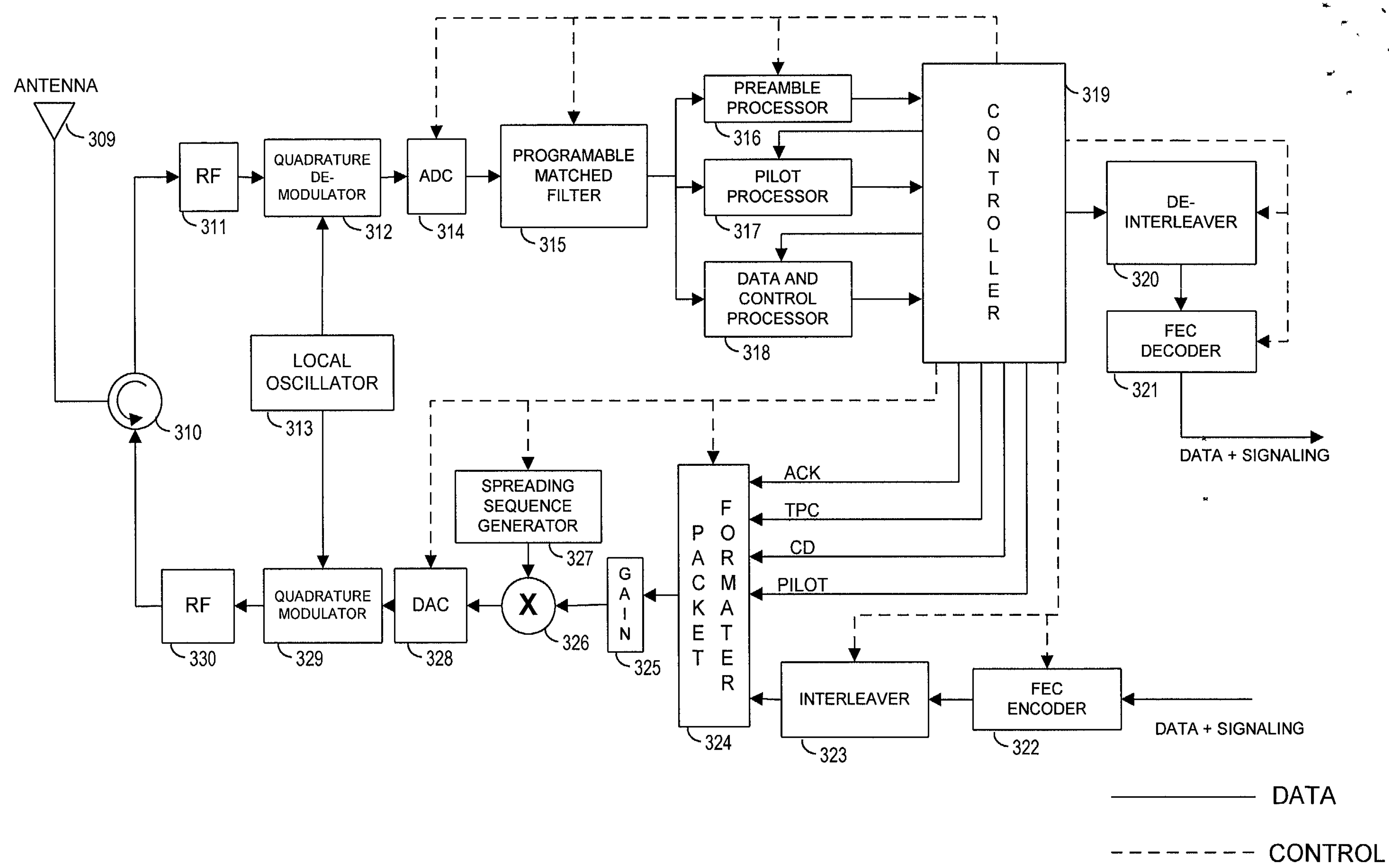

ANTENNA
309
RF
311
QUADRATURE DE-MODULATOR
312
ADC
314
PROGRAMABLE MATCHED FILTER
315
PREAMBLE PROCESSOR
316
PILOT PROCESSOR
317
DATA AND CONTROL PROCESSOR
318
CONTROLLER
319
DE-INTERLEAVER
320
FEC DECODER
321
DATA + SIGNALING
310
LOCAL OSCILLATOR
313
SPREADING SEQUENCE GENERATOR
327
PACKET FORMATER
324
ACK
TPC
CD
PILOT
RF
330
QUADRATURE MODULATOR
329
DAC
328
X
326
GAIN
325
INTERLEAVER
323
FEC ENCODER
322
DATA + SIGNALING
DATA
CONTROL

FIG. 3

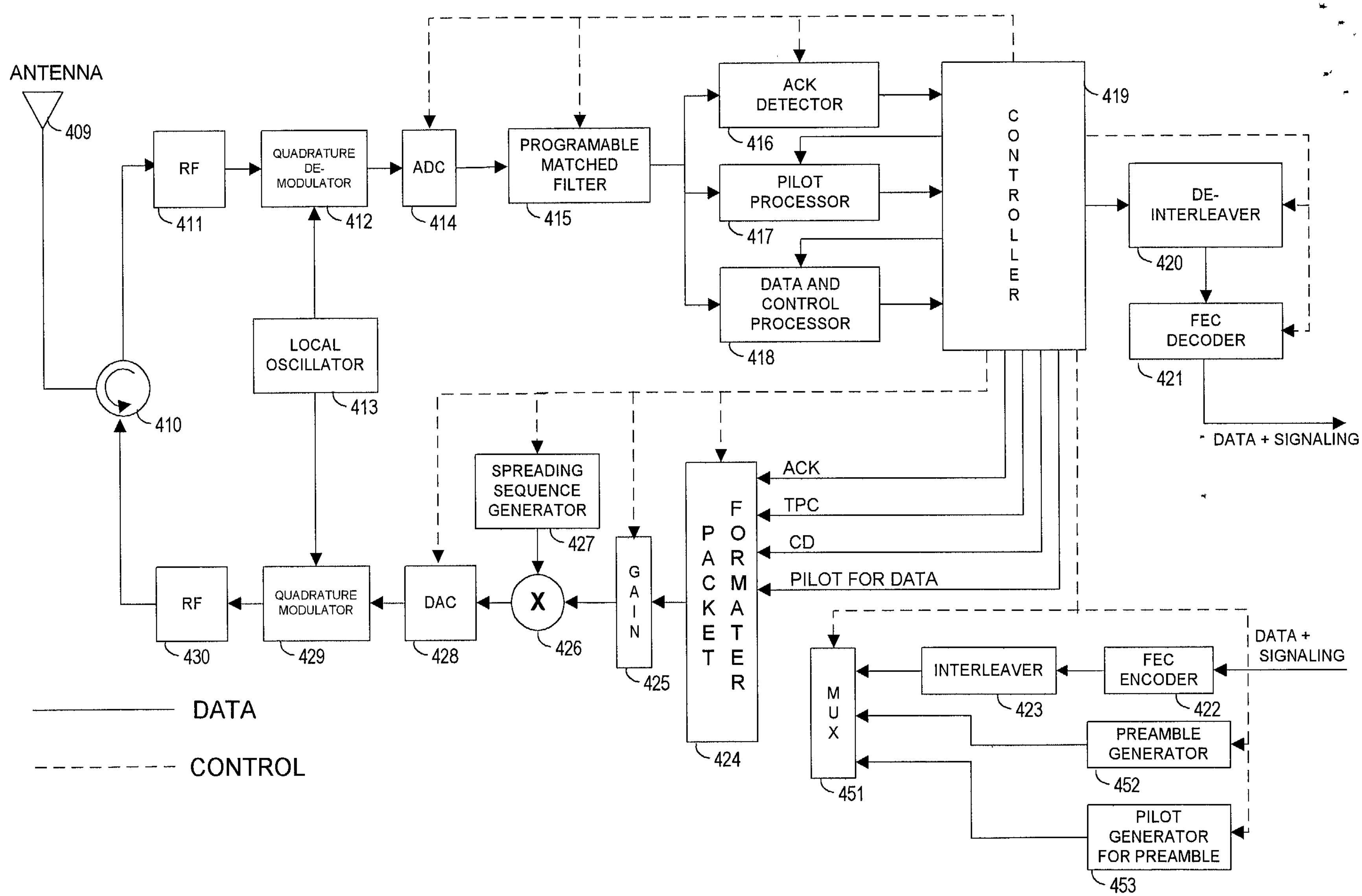
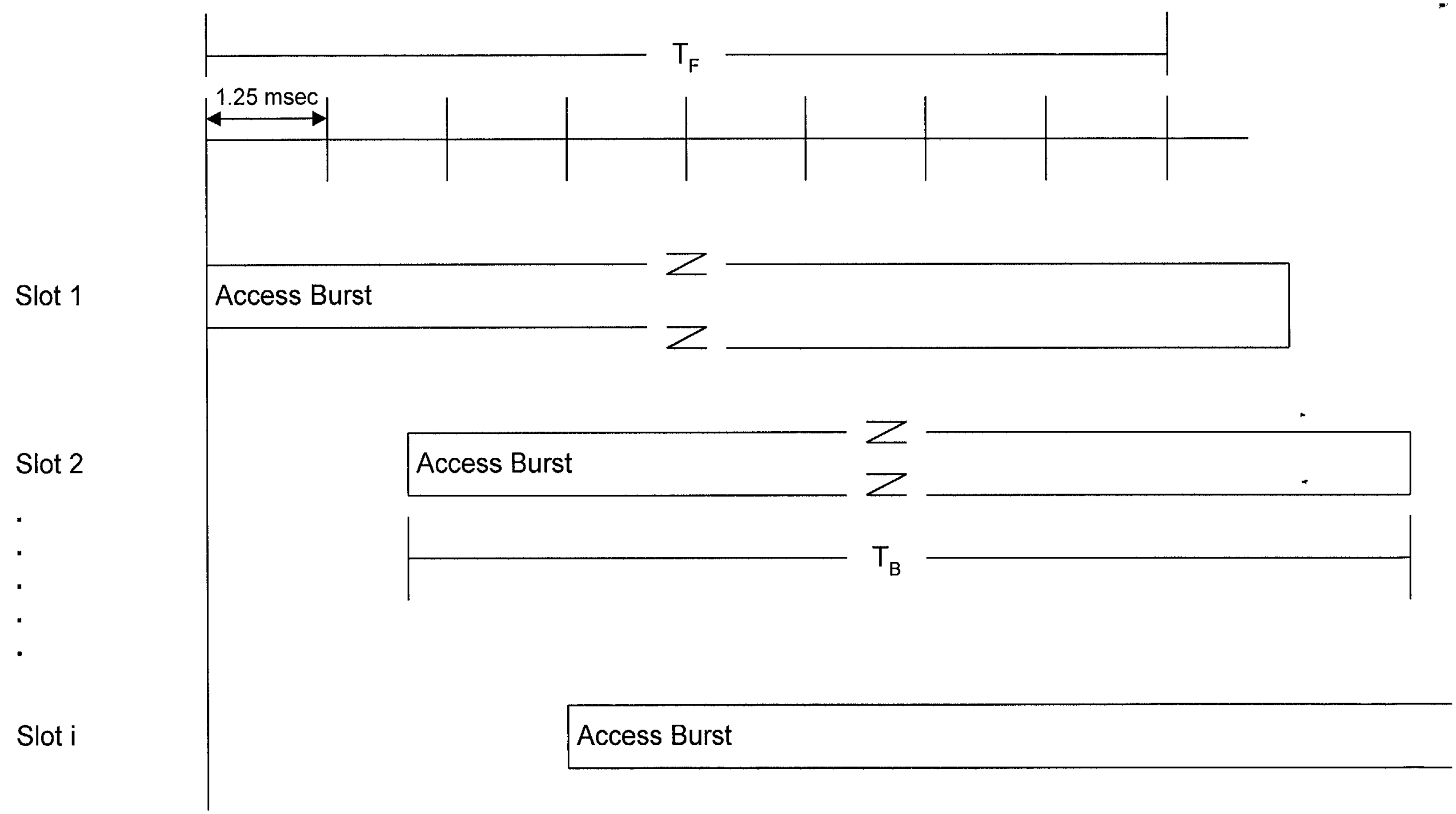

ANTENNA
409
RF
411
QUADRATURE DE-MODULATOR
412
ADC
414
PROGRAMABLE MATCHED FILTER
415
ACK DETECTOR
416
PILOT PROCESSOR
417
DATA AND CONTROL PROCESSOR
418
CONTROLLER
419
DE-INTERLEAVER
420
FEC DECODER
421
DATA + SIGNALING
410
LOCAL OSCILLATOR
413
SPREADING SEQUENCE GENERATOR
427
ACK
TPC
CD
PILOT FOR DATA
PACKET FORMATER
424
GAIN
425
X
426
DAC
428
QUADRATURE MODULATOR
429
RF
430
MUX
451
INTERLEAVER
423
FEC ENCODER
422
DATA + SIGNALING
PREAMBLE GENERATOR
452
PILOT GENERATOR FOR PREAMBLE
453
DATA
CONTROL

FIG. 4



T_F
1.25 msec
Slot 1
Access Burst
Slot 2
Access Burst
T_B
Slot i
Access Burst

FIG. 5

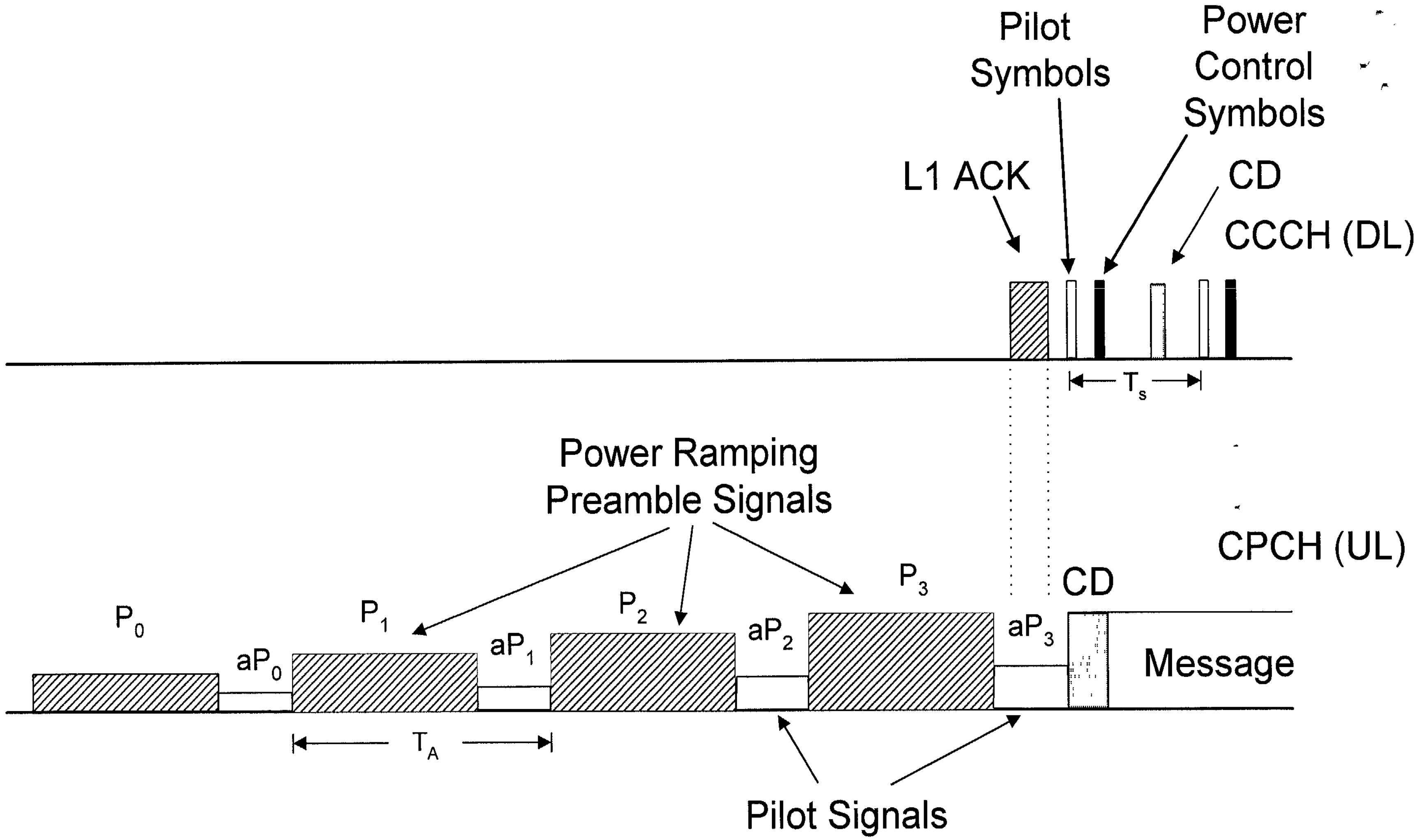

Pilot Symbols
Power Control Symbols
L1 ACK
CD
CCCH (DL)
T_s
Power Ramping Preamble Signals
CPCH (UL)
P_0
aP_0
P_1
aP_1
P_2
aP_2
P_3
aP_3
CD
Message
T_A
Pilot Signals

FIG. 6

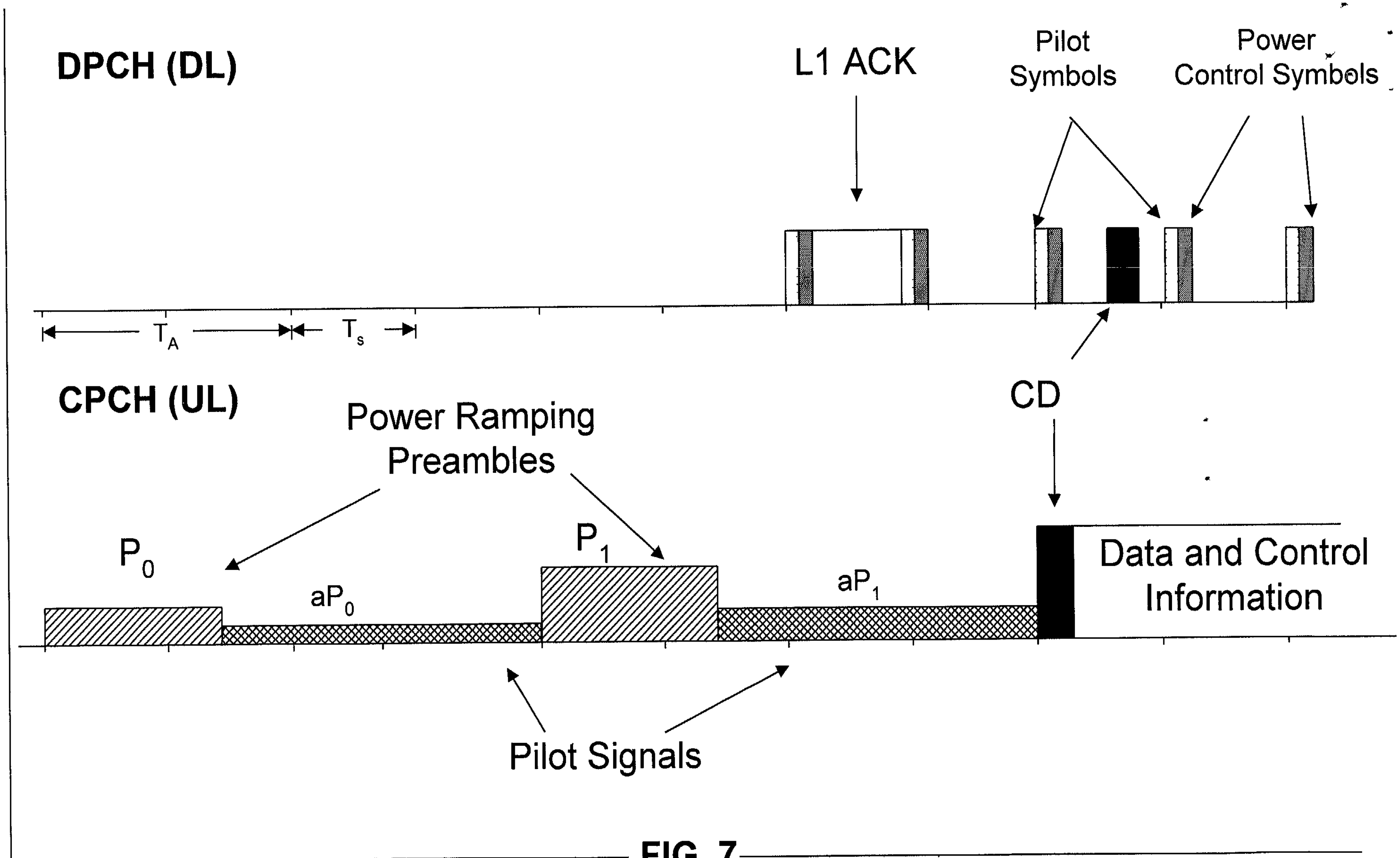

DPCH (DL)
L1 ACK
Pilot Symbols
Power Control Symbols
T_A
T_s
CD
CPCH (UL)
Power Ramping Preambles
P_0
aP_0
P_1
aP_1
Data and Control Information
Pilot Signals

FIG. 7

$g_{k,0}A$	$g_{k,1}A$	$g_{k,2}A$	— — — — — — — —	$g_{k,N-1}A$

(A)

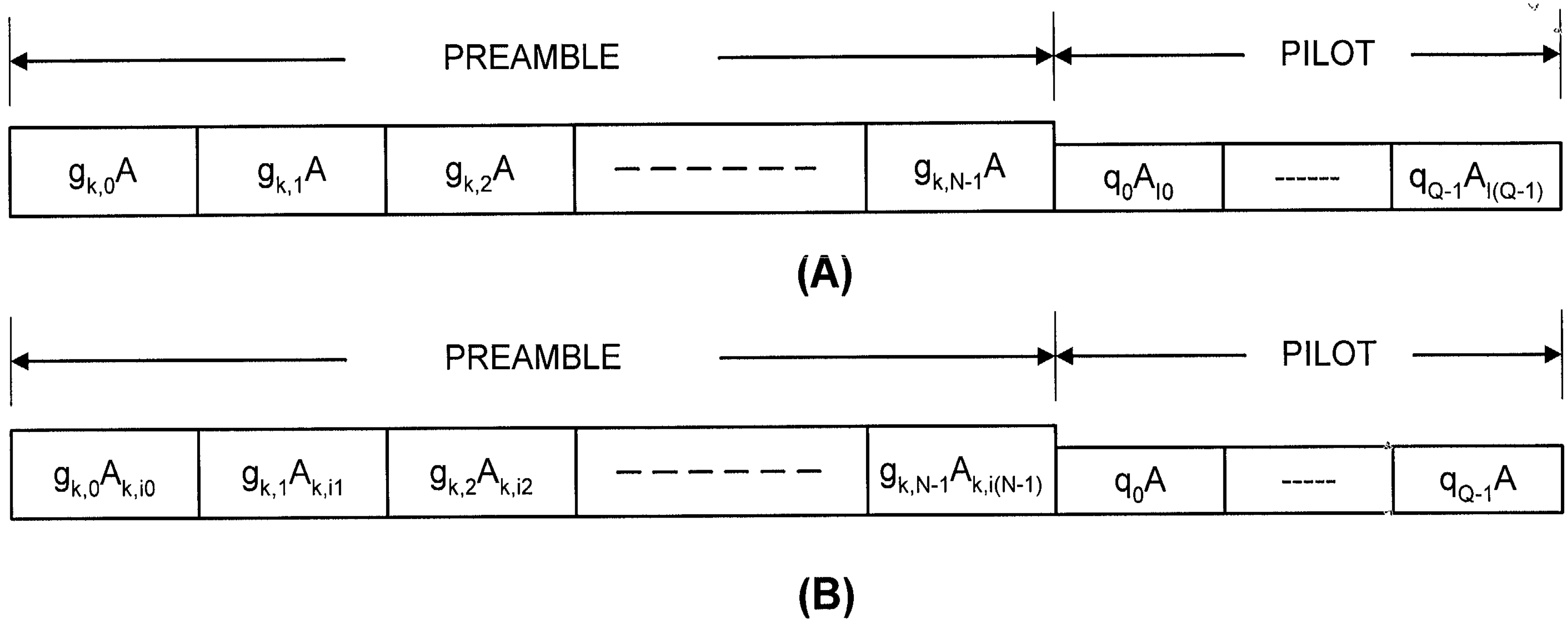
$g_{k,0}A_{k,i0}$	$g_{k,1}A_{k,i1}$	$g_{k,2}A_{k,i2}$	— — — — — — — —	$g_{k,N-1}A_{k,i(N-1)}$

$$A_{k,ij} \in [A_0, A_1, A_2, \ldots\ldots, A_{N-1}]$$

$$A_{k1,ij} \neq A_{k2,ij}$$

(B)

FIG. 8



$$A_{k,ij} \in [A_0, A_1, A_2, \ldots.., A_{N-1}]$$

$$A_{k1,ij} \neq A_{k2,ij}$$

FIG. 9

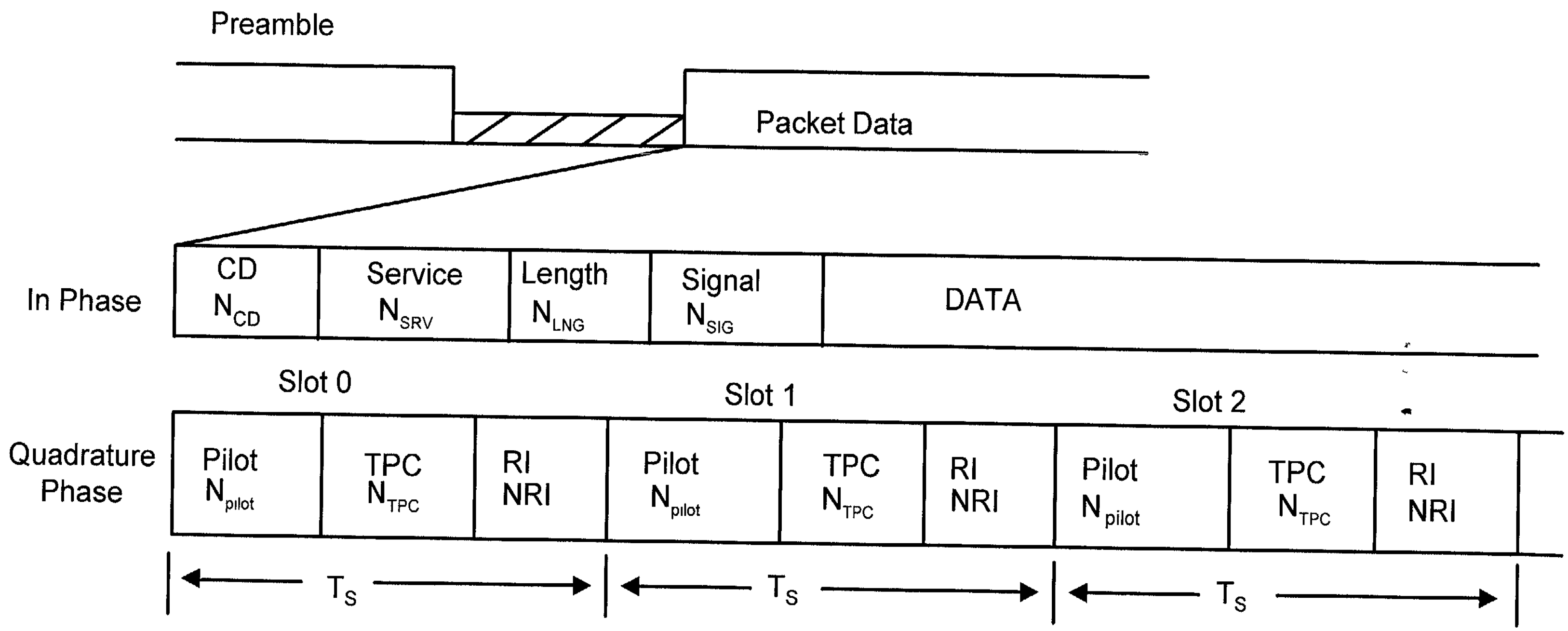

Preamble
Packet Data
In Phase
CD N_{CD}
Service N_{SRV}
Length N_{LNG}
Signal N_{SIG}
DATA
Slot 0
Slot 1
Slot 2
Quadrature Phase
Pilot N_{pilot}
TPC N_{TPC}
RI NRI
Pilot N_{pilot}
TPC N_{TPC}
RI NRI
Pilot N_{pilot}
TPC N_{TPC}
RI NRI
T_S
T_S
T_S

FIG. 11

Attorney Docket: GBTI53US

DECLARATION AND POWER OF ATTORNEY

As below-named inventors, we hereby declare that: our residences, post office addresses, and citizenship are as stated below next to our names; that we believe we are the original, first, and sole inventors of the subject matter which is claimed and for which a patent is sought on the invention entitled:

COMMON PACKET CHANNEL

the specification which was filed on March 22, 1999, having Serial No. 09/273,508.

We hereby state that we have reviewed and understand the contents of the above-identified patent application, including the claims.

We acknowledge the duty to disclose information which is material to the examination of this application, in accordance with Title 37, Code of Federal Regulations, § 1.56(a).

We hereby appoint the following attorney to prosecute this application and transact all business in the Patent and Trademark Office connected therewith: David B. Newman, Jr., Registration No. 30,966.

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We hereby declare that all statements made herein of our own knowledge are true and that all statements made on

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information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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Docket No.: 57042-013 (GBTI65US) **PATENT**

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of	:	
Emmanuel KANTERAKIS et al.	:	
Serial No.: 09/304,345	:	Group Art Unit: 2734
Filed: May 4, 1999	:	Examiner:

For: COMMON PACKET CHANNEL WITH FIRMWARE HANDOFF

ASSOCIATE POWER OF ATTORNEY and CHANGE OF CORRESPONDANCE ADDRESS

Assistant Commissioner for Patents
Washington, DC 20231

Sir:

As President of Golden Bridge Technology, Inc., the assignee of the above-identified patent application by virtue of an assignment from the inventors recorded at reel 9971, frame number 0541, I, Elmer Yuen, hereby appoint Keith E. George Registration No. 34,111 and Gene Z. Rubinson Registration No. 33,351 associate attorneys as additional attorneys authorized to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith.

Please direct all future Correspondence and telephone calls to:

Keith E. George
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(202) 756-8000

Respectfully submitted,

Elmer Yuen

Dated: February 24, 2000.

Docket No.: 57042-036 **PATENT**

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of	:	
Emmanuel KANTERAKIS, et al.	:	
Serial No.: (Divisional of Serial No. 09/273,508)	:	Group Art Unit:
Filed: October 05, 2000	:	Examiner:
For: COMMON PACKET CHANNEL	:	

Honorable Commissioner of
Patents and Trademarks
Washington, D. C. 20231

CORRESPONDENCE ADDRESS CHANGE

Sir:

Please change the records to indicate the current firm name and telephone number for the above-identified application and forward all future correspondence as follows:

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